Klamath Network
Inventory and Monitoring Program

National Park Service
U.S. Department of Interior

Natural Resources Database
Software User Manual

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		Document Changes and Revisions	
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		13	replaced Figure 7 Back-end database identification with new figure depicting new fields - "Short Name" and "Full Name"
		3	added reference to Software Version Description document
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		29	Added information retrieval image to section 5.2.5 and replaced existing text to identify current capabilities.
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1 Scope

1.1 Identification

This Software User Manual applies to the user interface which comprises a portion of the software product identified as the Klamath Network Natural Resources Database or KLMN-NRD.

1.2 System overview

The Klamath Network Natural Resources Database represents a standardized set of database tables, structures, field definitions and associated user interface consisting of user displays/forms, reports and queries, which may be used with a wide range of natural resource field data.

The software and data structures comprising this database are contained within two separate but tightly coupled MS Access database files utilizing the JET database manager. This design is a modification of the classic two tier design and is commonly referred to as a "back-end" and "front-end". The classic two-tier design identifies separate database and user interface layers whereas this design consists of a separate database layer and mixed database/user interface layer thru the use of linked database tables within the user interface layer.   Figure 1 System overview depicts this relationship. This figure illustrates three connected back-end databases; however the front end can accommodate hundreds of compatible "back-end" databases.
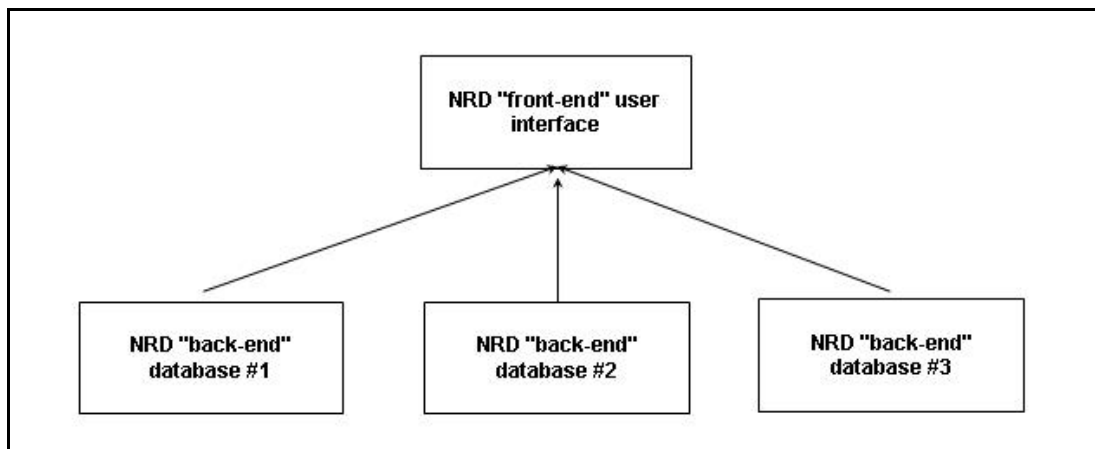
Figure 1 System overview

The NRD "front-end" user interface accesses the contents of the "back-end" database primarily thru the linking of "back-end" tables into the "front-end". This process is moderated by software in the "front-end" which performs the linking of "back-end" objects into the "front-end" by accessing a list of objects identified in the "back-end" "`tbl_Database_Link_Items`" table. This occurs when the user selects and links to a 'back-end' database.

1.3 Document overview

The purpose of this document is to convey operational information to the user community. Specific information regarding the software involved, installation information, operating environment and operation and use of the user interface is identified herein. Detailed information regarding the structure and modification of the "back-end" database is outside the scope of this document and is contained within the *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* document.

2 Software Summary

2.1 Software application

The Natural Resources Database is intended to be used by resource and data managers, research scientists, field crews, data entry personnel and others involved in data collection and management of natural resource information.

The design of both the "front-end" and the "back-end" portions allow for customization or modification to suit particular natural resource datasets. Both portions contain standardized forms and database structures as well as several "connection" points for customization. The "front-end" program may be used with any number of compatible "back-end" datasets. Dataset specific displays and data structures are provided for thru the use of "back-end" database specified forms and tables. Refer to the *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* document for specific information and guidance.

2.2 Software inventory

This Natural Resource Database consists of a minimum of two software components, which in this case are Microsoft Access database files that are required for proper operation of the Natural Resource Database. These are as follows:

> a. KLMN_NRD_FE_Vers_xxx.mdb; where "xxx" refers to version control information.
>
> b. KLMN_NRD_BE_Vers_xxx_yyyy.mdb; where "yyyy" indicates a specific dataset.

The first or "a" file is the user interface and contains all displays, queries, reports and control tables for all associated 'back-end" databases. The second or "b" file is the "back-end" database and consists of a related set of data usually representing a particular study or protocol. There may be one or many of these which may be accessed thru the standard "front-end".

2.3 Software environment

This section identifies the hardware, software, manual operations and other resources needed to install and run the software.

The Natural Resource Database should operate on any "standard" NPS desktop or laptop computer which has a minimum of 40Mb of spare hard drive capacity as well as any Microsoft Windows operating system, such as Windows XP Pro, which is capable of hosting either Microsoft Access 2002 (XP) or Access 2003, and of course, an installed copy of either MS Access 2002 (XP) or MS Access 2003.

The various displays and forms of the Natural Resource Database were designed for a display resolution of 1024x768. Higher resolutions will work, however the resulting displays will be corresponding smaller.

As this product provides reporting capabilities, access to a printer is required in order to generate hard-copy of the reports. Any modern laser or ink-jet printer should suffice. This printer may be local to the host computer or network accessible.

2.4 Software organization and overview of operation

As stated previously, the Natural Resource Database consists of two components, the "front-end" and the "back-end".   The "back-end" portion is the database and is described in the *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* document.

The user interface encapsulates the Inventory and Monitoring recommended design, *The Natural Resource Database Template Version 3* and the *Klamath Network's Site Information Form*. The user is presented with a number of interface displays to enter data, retrieve data and perform some maintenance activities. Refer to for a snap-shot view of this interface. Detailed information about the various functions may be found in .
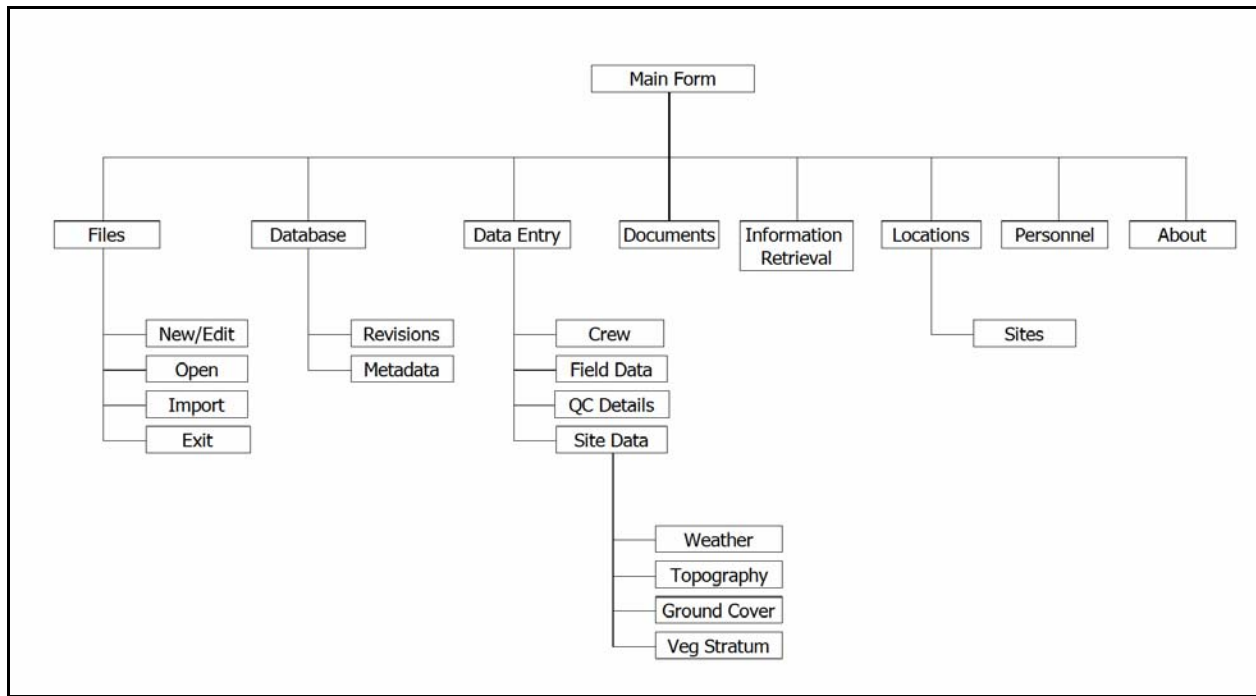
Figure 2 User interface functional diagram

2.5 Assistance and problem reporting

To obtain assistance in the use of this product, first contact either your supervisor or the individual providing this software to you or the Klamath Network Data Manager. Problems encountered while operating this software should be identified, documented and forwarded to the Klamath Network Data Manager. Please include ALL possible information. Identify the display being used, what mode (review, add, edit etc), the exact contents of any error message, and should the worst happen, the module and line of code that is failing. Also very important is whether or not you can repeat the error reliably.

3 Access to the software

3.1 First-time user of the software

3.1.1 Equipment familiarization

The user must be able to operate the computer equipment which is to be used to host the Natural Resource Database. As computer equipment varies widely, please contact your Computer Specialist or administrator for training on the use of the computer equipment provided to you.

3.1.2 Access control

At the time this document was originally written, there is no access control applied to the Natural Resource Database. For applications that require restricted access to the underlying data, a variety of mechanisms may be employed. Determination and selection criteria are outside of the scope of this document. Contact your Computer Specialist for assistance.

3.1.3 Installation and setup

The Natural Resource Database items, described in section 3.2, may be distributed in a variety of media, ranging from Internet/web download to compact disc (CD). From whatever medium you are instructed to use, copy the files to a convenient location on your computer hard drive. You may place the "front-end" file in a separate directory from that used to contain the 'back-end" database(s). One commonly used directory structure is the use of the `"C:\Program Files"` directory for installed programs. This may be a useful place to keep the "front-end" file with a "short-cut" icon placed on the desktop pointing to this file. The "back-end" file may be placed anywhere that is normally accessible from the computer on which the "front-end" will be used, including a network logical drive.

Once the files have been copied to your hard drive (or other acceptable R/W media), the software is ready to execute.

Although it may be possible to execute the user interface from a CD, this is not advised. The CD is a read-only media and any operations which require updating any table in the database, such as linking to another "back-end" database will fail.

3.2 Initiating a session

Initiation of a session may be accomplished in one of several ways. Using Windows Explorer, locate the folder and "front-end" file. Then double click the "front-end" file name. This should activate whichever version of Microsoft Access that is installed on your computer. Once MS Access has loaded the "front-end", you should be presented with a display similar in appearance to that depicted in <u>Figure 6 Main Display</u>. If this is NOT presented, simply select "Forms" on the MS Access database window, then double-click the form named `"frm_Main"`.

NOTE: DO NOT attempt to operate the user interface by selecting any other form/display. The results will be un-predictable and therefore unreliable and absolutely not supported. The user interface is designed to operate properly only when `"frm_Main"` executes first. Special software, activated during the start-up of this form, establishes the proper operating environment for the entire user interface.

At this point, the user interface will be "up and running". If this is an initial installation or you have moved or changed directories, you will have to identify the database and directory location for each "back-end" database that you plan to use. First you must identify the database (**Main form --> File --> New/Edit**. Refer to section 5.2.1.1for further information. After you have identified the databases, you must select which one you wish to operate with. This is

accomplished by linking to one of the databases. More information may be found in section 5.2.1.2.

3.3 Stopping or suspending work

There are no specific restrictions regarding this topic. However, it is advisable NOT to stop or suspend while in the process of entering data. Each data entry display has specific operating modes for the addition or modification of data. Once either of these modes is entered, the only options you will be presented with are to CANCEL or SAVE. If you select CANCEL, any changes or new data will be lost. If you select SAVE, you may be prevented from saving the data if what you have entered is incorrect or insufficient to pass any validity checking. Do not leave the computer or shut it down while either of these modes is active.

4 Processing reference guide

4.1 Conventions

There are several standard "components" and conventions utilized in the design of the user interface. These are as follows:

> a. Standard location and structure for menu bars.
>
> b. Standard location and structure for record navigation and form control
>
> c. Standard entry form behavior for Review, Add and Edit modes.

4.1.1 Menu bars

Several displays allow the selection of secondary functions. These utilize a menu bar that appears similar to that depicted in Figure 3 Menu bar example. The menu bar is always presented in the upper portion of a display using it, just below the standard banner, as depicted in Figure 6 Main display. Functions are selected by "clicking" on the appropriately titled function. The user interface software selectively enables or disables displayed functions depending on the state of the user interface or a particular display. For example, if a user has not identified a current database to link with, or the link is invalid, the user interface will disable ALL of the functions depicted in Figure 3 Menu bar example, except for the "About" and the "File" functions. For other displays such as the Events and Site Data entry, the menu bar will be disabled whenever the form is in an EDIT or ADD record mode.
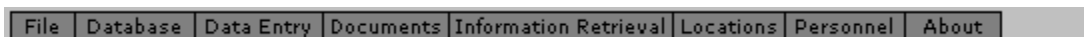

| File | Database | Data Entry | Documents | Information Retrieval | Locations | Personnel | About |

Figure 3 Menu bar example

4.1.2 Record navigation and form control

All forms, except the MAIN display, contain some variation of the controls depicted in Figure 4 Display control bar example. This control bar is always presented at the bottom of any display that uses it. Displays that are connected to a database record will display the record navigation controls depicted in the left portion of the example. The direction controls, i.e. Move Prev, Move Next, are disabled during ADD or EDIT operations. They will also be disabled if there are no records available.

The right side of the example identifies several "command box" type controls. All displays will have, as a minimum, the `"Close"` command box for closing the displayed form.   `"Help"` will be present as appropriate. If the displayed form supports database records, the `"Add"` and `"Edit"` command boxes will be displayed. If either of these is selected, the display enters the appropriate mode, both command boxes and the `"Close"` command are disabled, and two more command boxes are presented - `"Cancel"` and `"Save"`, their functions are self-explanatory.

Figure 4 Display control bar example.

4.1.3 Data entry forms

All data entry forms utilize some type of control for the user to select or enter data. These are commonly "text" or "dropdown" controls, with some use of "check box" and "item list" controls. These controls are either enabled or disabled depending on the state of the particular form. By default, each data entry display operates in a "read-only" mode, and the data entry controls are disabled. This "read-only" mode is visible to the user thru the use of a control background color that is moderately gray. Any data displayed can not be altered by the user. Placing the data entry display in either ADD or EDIT mode, by selecting the corresponding command, will alter both the appearance and behavior of the display. First, all data entry fields are enabled and secondly the background color of the entry fields changes to "white". This is illustrated in Figure 5 Example of ADD NEW record mode. Performing a `"Save"` or `"Cancel"` operation returns the display to "read-only", providing no errors are present. This "read-only" mode is illustrated in Figure 7 Back-end database identification.

Figure 5 Example of ADD NEW record mode.

4.2 Processing procedures

The following sections describe the operation of each of the functions depicted in Figure 2 User Interface Functional Diagram. This diagram illustrates the primary interconnects between the various displays and data entry forms.

When the user starts the user interface, he or she will be presented with the main form, depicted in Figure 6 Main display. The functions illustrated in the menu bar of this form may or may not all be displayed, as noted in section 5.1.1. This form is the access point for all secondary functions. When the user wishes to close, or exit, the user interface, this may be accomplished by "clicking" the termination box "X" in the upper right of the display or by selecting **FILE --> EXIT**.
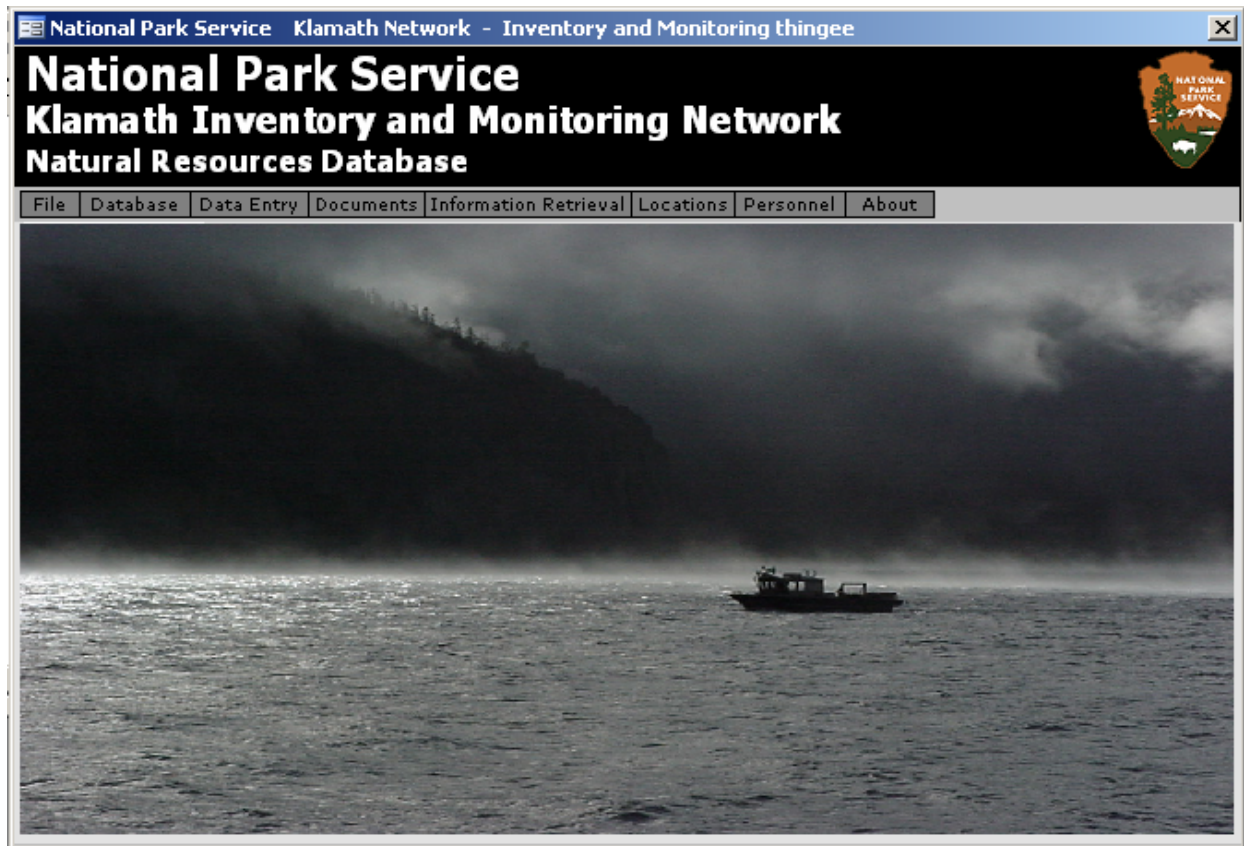
Figure 6 Main display

4.2.1 File

Selecting **File** from the main display, will present the user with a "drop-down" list of secondary functions, as depicted in <u>Figure 2 User Interface Functional Diagram</u>. These are used to add/edit the existing list of available "back-end" databases, select or link to one for use, import a downloaded copy of the USDA Plants database, or exit the user interface.

4.2.1.1 New/Edit

This is the mechanism by which "back-end" databases are identified to the "front-end" user interface. To select this function, start at the main form then select: **FILE --> NEW/EDIT.** Refer to <u>Figure 7 Back-end database identification</u> for the following discussion. In order to add a NEW "back-end" database, the user must first select the `"Add"` command box. The display will change to ADD mode with all fields blank. At this point, the user should select the `"Browse"` command, which will present a standard Windows file open dialog box. Locate and select the desired "back-end" database. IMPORTANT NOTE: The selected "back-end" database MUST be compatible with the standard design for "back-end" databases. If not, ugly things may happen. If the selected database is properly designed, the user interface software will open the database and execute a query against this database to retrieve information about the database;

this information must be located within the `"tbl_Database_Identification"` table. The retrieved information will then populate the appropriate fields and the directory path and database file name will be added as well. There is NO need to modify any of the presented data if the "back-end" database has been correctly designed. If you wish the gory details, refer to the *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* document.

To change the directory path, select the `"Edit"` command, and then repeat the above instructions for ADD mode.

The `"Field Data Form"` field identifies the root display that is specific to the structure and contents of the field data in the associated "back-end" database. The software in the user interface will activate the identified display when the user selects **Field Data** located on the Events display.

Figure 7 Back-end database identification

4.2.1.2 Link

This function is the one to use to select a "back-end" database for use. After selecting the command, via **FILE --> LINK,** a display similar to that depicted in <u>Figure 8 Link to back-end database</u> will be presented. The central portion of the display will list ALL currently identified "back-end" databases (refer to previous section for more information). Use the mouse to select the database of interest (click the row of interest), then select the colored command bar `"Link to the Selected Database"`. The user interface software will attempt to access the database and query a table `(tbl_Database_Link_Items)` to identify what objects must be linked into. If the database is not where it is supposed to be, or is not compatible in design, the

linking will fail with error messages. If all is as it is supposed to be, all existing "back-end" tables previously linked into the "front-end" will be de-linked and those identified in the new "back-end" will be linked into the "front-end". Any tables that are of no use to the new database will be removed. A special table, located in the "front-end" (tbl_Database_ProtectedTables), identifies those tables that must not be removed by this process. After the new database has been linked, a message will be presented to you and the name of the database will be added to the title banner, as may be seen in Figure 9 Database revision display.
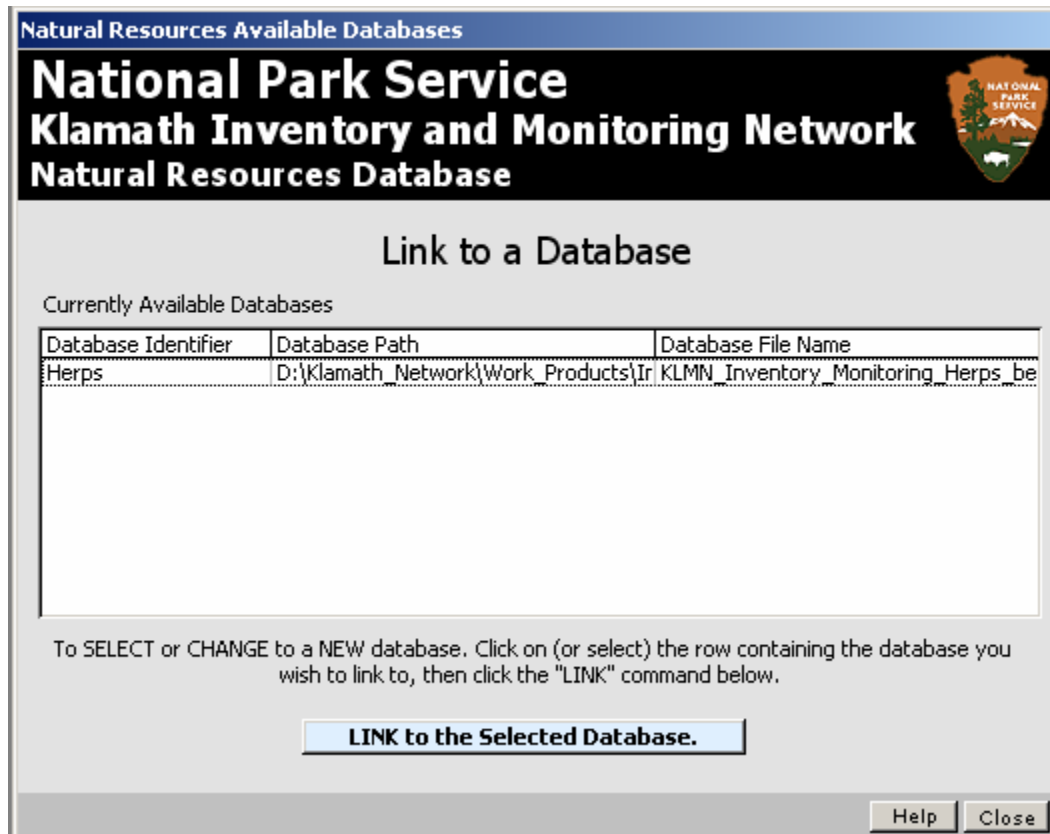

Figure 8 Link to back-end database.

4.2.1.3 Import USDA

At the time this document was written, this function had not been implemented. We had thought to add into the database the ability to periodically link the USDA Plant Database for vascular plant work. We have suspended that effort for the time.

4.2.1.4 Exit

This function is fairly self explanatory. Selecting this will close the Natural Resource Database.

4.2.2 Database

This section of the user interface encapsulates a number of functions that are not used on a daily basis - database revision information and meta-data linkages between the "back-end" database and external meta-data repositories.

4.2.2.1 Revisions

This function is not normally used by the end user, except to examine changes made to the database over time. Additions should only occur when STRUCTURAL changes are made to the associated "back-end" database. Please do not use it to identify additions or modifications of the DATA in the database.

Figure 9 Database revision display

4.2.2.2 Metadata

This display is used to associate National Park Service Inventory & Monitoring metadata systems with the "back-end" database. The "NR/GIS Metadata Database ID" and the "Dataset Catalog ID" are unique identifiers copied from the appropriate records in those databases. Refer to the *Natural Resource Database Template Version 3 Documentation* for more details about the intended usage of these fields.

Figure 10 Metadata.

4.2.3 Data Entry

Data entry is the primary reason for which this product has been developed. Data entry consists of several different information categories - related documents; survey locations; sites; personnel; and field data in the form of "events". Data should be entered as it becomes available; personnel should be known well in advance of field activities and can be entered prior to field trips. Location and site information can be entered ahead of time with actual coordinate data entered later. By entering as much of this type of data as possible prior to adding field data, data entry in the field will tend to be much easier.

4.2.3.1 Events

As can be identified in Figure 2 User Interface Functional Diagram; this function is the most complex in terms of data and number of displays. Conceptually, each field sampling trip represents an "event". Ideally, each event has a discrete beginning and a discrete ending, thus each event represents one record in the "tbl_Events" table, and thusly, one record visible in the Events display. Each event record has associated with it a number of secondary records located in separate data tables. Refer to the *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* document for details on these structures and tables.

To access the Events function, select **Main form --> File --> Data Entry.** The Main display will become invisible and the display depicted in Figure 11 Sampling event data entry display will be presented. If this is the first time use of the "back-end" database and there are no "event" records in the database, the Events Data Entry Display will automatically be placed in ADD new record mode. Otherwise it will be presented with data and be placed in "read-only" mode, as shown in

the following figure. The functions identified in the menu bar will not be visible in either ADD or EDIT modes. Ideally, supporting information, such as "Locations" and "Documents" will have been entered prior to entering Event data. If not, the entered data must be EDITED at a later data when the supporting information has been entered.

Figure 11 Sampling event data entry display

4.2.3.2 Event Crew

After an Event record has been created, it will be possible to identify personnel associated with that particular event. To identify and associate these personnel, select **Crew**, located on the menu bar of the Events data entry display. Associated field personnel are aggregated into a single display, depicted in Figure 12 Sampling event crew display. There will only be ONE record for display, upon first access, with no prior associated personnel, the display will automatically be placed into the ADD mode and the right hand portion, labeled "Crew List" will be empty. After an initial set of personnel have been associated, the ADD function will be disabled and only EDIT will operate. In either case, to associate personnel with the current Event record, simply "click" on a name in the left hand area, identified as "Available Contacts". The selected name will appear above in the "Crew Member" field. At this point, you MUST identify an "Activity Role" for this individual before the "ADD >" command box becomes active. Clicking this will then associate the selected individual and activity role with the current event record.

If an individual does not appear in the "Available Contacts" list, click on the "Contacts" command box. This will transfer to the Personnel Contact display depicted in Figure 24 Personnel. You may add additional personnel at that time. Closing the Personnel Contact

display will re-activate the Crew Identification display and re-populate the `"Available Contacts"` list.

If a person has been added to the `"Crew List"` in error, click on that individuals name to highlight it, and then click on the `"Remove"` command box at the lower right of that list. This will remove the individual from the crew list, but will not remove them from the list of available personnel.

When finished with ADD or EDIT, clicking on `"SAVE"` will save the data visible on the display. Clicking `"CANCEL"` will discard ALL changes that have made. Note: It is possible to add an individual more than once and assign a different role to each occurrence.

Crew Identification

National Park Service
Klamath Inventory and Monitoring Network
Natural Resources Database

Inventory And Monitoring Events People

Crew Member	Activity Roles			Crew List		
		▼	Add ▶	Blutarski	Jim	Voucher ID Specialist
				Baggins	Bilbo	Team Leader

Available Contacts

Baggins	Bilbo
Blutarski	Jim
Dynamic	Duo
Hotdogue	Bill
Klapatch	Ken
Moldavia	Bill

Contacts | Remove

Help | Add | Edit | Close

Figure 12 Sampling event crew display

4.2.3.3 Site Data

During each sampling event, specific information is required to document the conditions found at the sampling site. These conditions identify climate and elevation zones, weather, site topography, ground cover characteristics and vegetation strata. This information is recorded on the *Klamath Network's Site Information Form*. While all of the information identified on that form could be represented in one ji-goon-doh data entry display, it was felt that too many users would express their unhappiness to the designer, so in the interest of the designer's longevity, the

site information data has been divided into a number of smaller, easier to use displays. These displays all "tier" off of the main site data display depicted in Figure 13 Site data display by selections present on the display's menu bar.

Referring to Figure 13, there are several key points of interest. The first is the menu bar at the upper portion of the display. This menu bar provides the "connection" to the associated information categories identified in the menu bar. This menu bar may or may not be functional depending on the state of the display. This behavior is described in detail in section 5.1.1.

Figure 13 Site data display
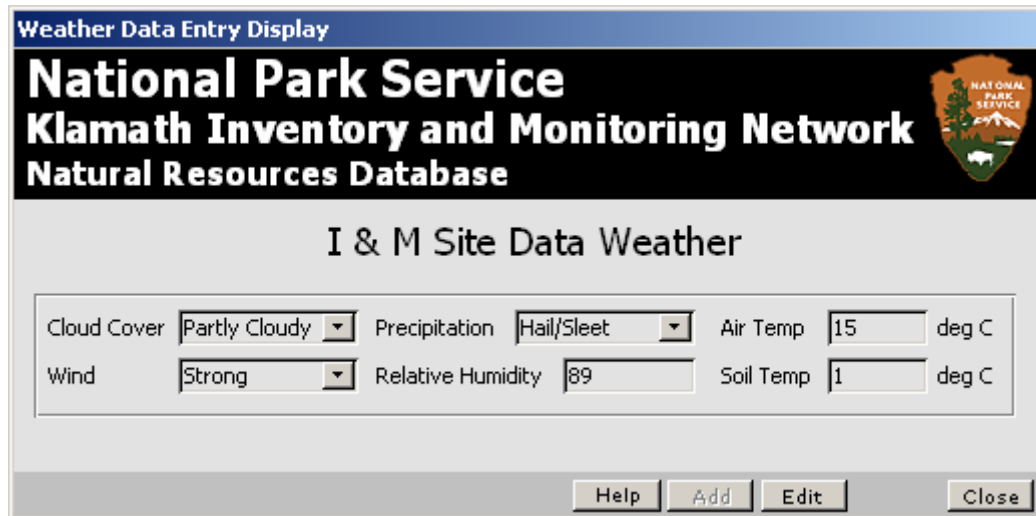
These records are linked TO the primary site data table `"tbl_Site_Data"` which serves as the root record for this information. You cannot enter data for any of the categories identified on the menu bar UNLESS a root Site Data record has been created using the Site Data display. Once that has been accomplished and the data saved, the menu bar will be activated and the displays become accessible for data to be entered for those categories.

Another item of interest is the lack of record navigation controls. The reason is simple - the relationship between the Event display (`"tbl_Events"`) and this display is a "one-to-one" relationship - there can only be one record, therefore no navigation controls are needed.

One more item of minor interest is the command box with the colored geometric shapes located to the right of the Climate Zone drop-down. Clicking on this will present a display with a map depicting the various climate zones within the Klamath Network.

4.2.3.3.1 Weather

Weather information collected during a field operation is to be recorded using this display. The individual recording these conditions should be experienced or versed in estimation of cloud coverage and wind strengths. A small hand-held wind meter comes in handy for determining wind speed, although a simple dual purpose wind and relative humidity sensor may be crafted in the field using a bit of water and a dunked digit held aloft.

Figure 14 Site weather display

4.2.3.3.2 Topography

This display is also rather straight forward. One item of note are the fields for `"Plot Length"` and `"Plot Width"`. These fields are to record the length, in meters, of a plot's MINOR and MAJOR axis, all geometric shapes will have these, including a circle, in which case the MINOR and MAJOR axis are equal.

One more item of minor interest is the command box with the colored geometric shapes located to the right of the `"Slope Shape"` drop-down. Clicking on this will present a display with graphics depicting the various slope shapes and their convolutions.

Figure 15 Site topography display

4.2.3.3.3 Ground Cover

This display is used to record the overall composition of the ground cover at a particular sampling location. The data entry fields record the PERCENTAGE of coverage of that particular type of ground cover. As we live in a standard Euclidian geometric world, the total of ALL ground cover percentages should not exceed 100%.

Figure 16 Site ground cover display

4.2.3.3.4 Vegetation Stratum

This display is used to record the four vegetation strata of a given sampling site. Please refer to Figure 17 Site vegetation stratum display for this discussion. At the upper part of the data entry portion, labeled "Leaf Phenology...." are two sets of "check-box" areas. These are used to identify the existence and type of vegetation coverage. Each group only allows ONE selection, so chose wisely. Upon choosing a selection, the appropriate stratum layer(s), listed in the section titles "Vegetation Strata" will either become enabled for use or disabled. The certain entry fields will become disabled when the "Not Applicable" check box is selected. Dominant species names are to be entered, however if the species is not known while in the field or not readily identifiable, then enter some relevant text rather than leaving the field blank. After returning from the field, it will be easier to properly identify the species and then enter the proper special name.

Figure 17 Site vegetation stratum display

4.2.3.4 Field Data

At the current time, there are no specific data entry displays for field data. Since each inventory or monitoring project will likely address a different set of field data, it will be up to the Klamath Network Data Manager or specific project team to create a data entry form unique to that project.

The "front-end" database has included with it two template forms for field data, identified as "`frm_Field_Data_xxxx`" and "`frm_Field_Data_xxxx_yyyy`". The first is designed as a "root" display similar in function and appearance to the display depicted in Figure 13 Site data display, but without any data entry fields. The "xxxx" in the form name must be replaced with a unique name, ideally something that describes the data it is being used for, such as "Bats" or "Herps". A suggestion is to use the same "short form" name that is used for the database.

Refer to Figure 7 Back-end database identification, field "`Short Name`". Please remember that many field data forms may be created for many different datasets AND THEY WILL ALL RESIDE IN ONE "front-end", so it is very important to uniquely identify each one.

An example of a field data display is illustrated in Figure 18 Field data display example. This is a sample display created specifically for a particular herpetology study. As this is the only display needed, the template form "`frm_Field_Data_xxxx_yyyy`" was used and renamed. In this case the form name would be "`frm_Field_Data_Herps`".

Figure 18 Field data display example

The second form, identified in a previous paragraph, is designed to be used as a secondary field data form or display. It should carry the save form name as its parent but with a function specific suffix in place of the "yyyy". An imaginary example of the primary or root form may be

"frm_Field_Data_Herps" and secondary forms "frm_Field_Data_Herps_Newts" and "frm_Field_Data_Herps_Frogs". There may be any number of these secondary displays connected to the primary or root "frm_Field_Data_xxxx" up to the limit of available space on the root form's menu bar. An example of this may be found by reading the sections about "Site Data". When creating any of these displays, it is important to remember that the name of the root display MUST be identified in the "back-end" database table "tbl_Database_Identification" and visible in the "Field Data Form" field of the "back-end" database identification form, described in section 5.2.1.1 of this document, when the record for this database is displayed.

All displays that are secondary to the primary or root field data entry form must be managed by root field form. There are a number of "code behind" modules in place for each of these template displays. These modules are mainly "place-keepers" and have limited functionality in many cases. You must modify the appropriate modules/code as appropriate for your particular application. Examination of the "code behind" software instructions for similar displays (Site Data etal.) is highly recommended.

4.2.3.5 QC Details

Quality control of the database is very important and one way to accomplish this is to identify the individual(s) responsible for each portion of the process. Each sampling event will identify those individuals involved in the collection activity via the Event Crew display. The QC Details function is then used to identify those individuals who entered, updated or verified the event information as it exists in the database. Figure 19 QC Details identifies the data entry display used to record those individuals. The three drop-down lists are populated by the contents of the personnel table (tbl_Contacts). If an individual is not listed in the drop-down, simply go to the "Personnel" data entry display and create a record for that person. Once the data has been entered and verified, it is desirable that further modification be disallowed. This will be accomplished by checking the "Lock Record" check box. Once this has been performed, and the record saved, the associated Event and any associated site data, field data, etc will be excluded from recall thru the "Data Entry" process. It will still be available to any information retrieval function as well as direct access to the "back-end" database.
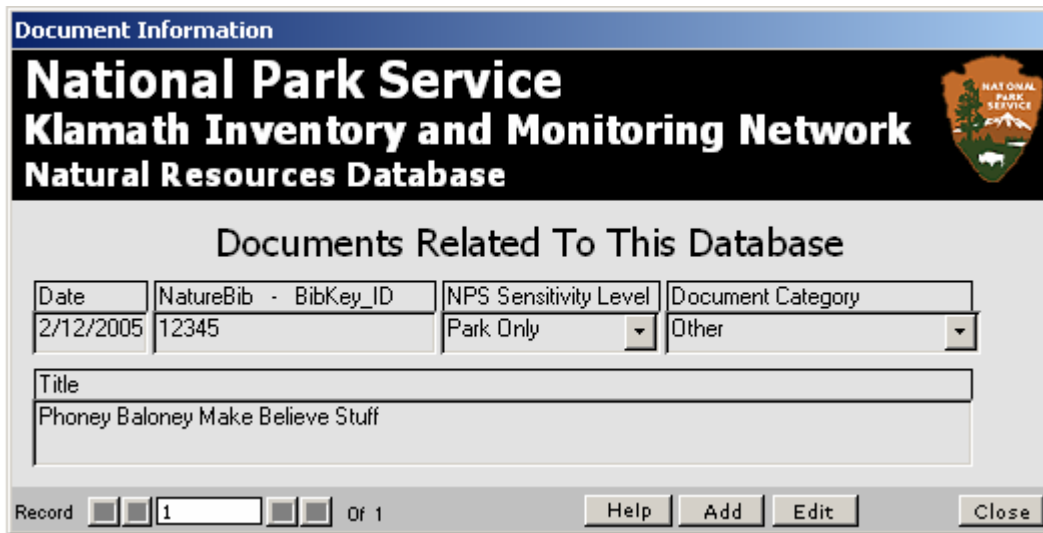
Figure 19 QC Details

4.2.4 Documents

Each survey or study produces a variety of documentation, be they maps, sketches, photos, reports, field sheets etc. The documentation function build into this product serves to "connect" such documentation to particular records in the 'back-end" database. It is envisioned that the NPS Nature Bib product will serve as the primary repository for knowledge about ALL documents for ALL projects. However, it is sometimes desirable to associate information in a database, in this case a particular "back-end" database with just that set of documentation relevant to it. That is the purpose of the "Documents" function. The user interface display and associated data store `"tbl_Documents"` serves as the nexus between the "back-end" database and Nature Bib or any other repository system. A minimal set of information is duplicated into the "back-end" database as illustrated in <u>Figure 20 Document identification</u>. Most of the fields are self explanatory, the two drop-down controls, `"NPS Sensitivity Level"` and `"Document Category"` contains standard Nature Bib qualifiers.

Figure 20 Document identification

There is no specific order in which documents may be identified, whether prior to entering any other data into the database or later. The database and user interface can accommodate either method, although it is best to identify known documents ahead of actual usage. The Nature Bib BibKey_ID may be entered at a later date by editing the appropriate document record.

4.2.5 Information Retrieval

Information retrieval, by its very name, is used to extract information from the Natural Resources Database that is currently selected. At the present, only report type extraction is available. Refer to Figure 21 Information Retrieval for the following discussion. To extract information and generate a report, one has only to select the report of interest and "click" the green command box - "Generate Selected Report". This will extract the data associated with the report, format the data and present a "preview" display which may be examined at the display or printed for later reference.

There are two categories of report that may exist and be displayed in the central part of the display. One of these categories are those reports that are applicable to ALL "back-end" databases and do not address any specific field data. The second category consists of those reports that DO pertain to database unique field data. These reports will only be listed when the corresponding "back-end" database has been linked with.

Reports may be added to the "front-end" without modification to the user interface. The list of reports which are identified on the display is extracted from a database table "tbl_Database_Reports". Please refer to *Klamath Network Inventory and Monitoring Natural Resources Database - Database Design Description* for more details.
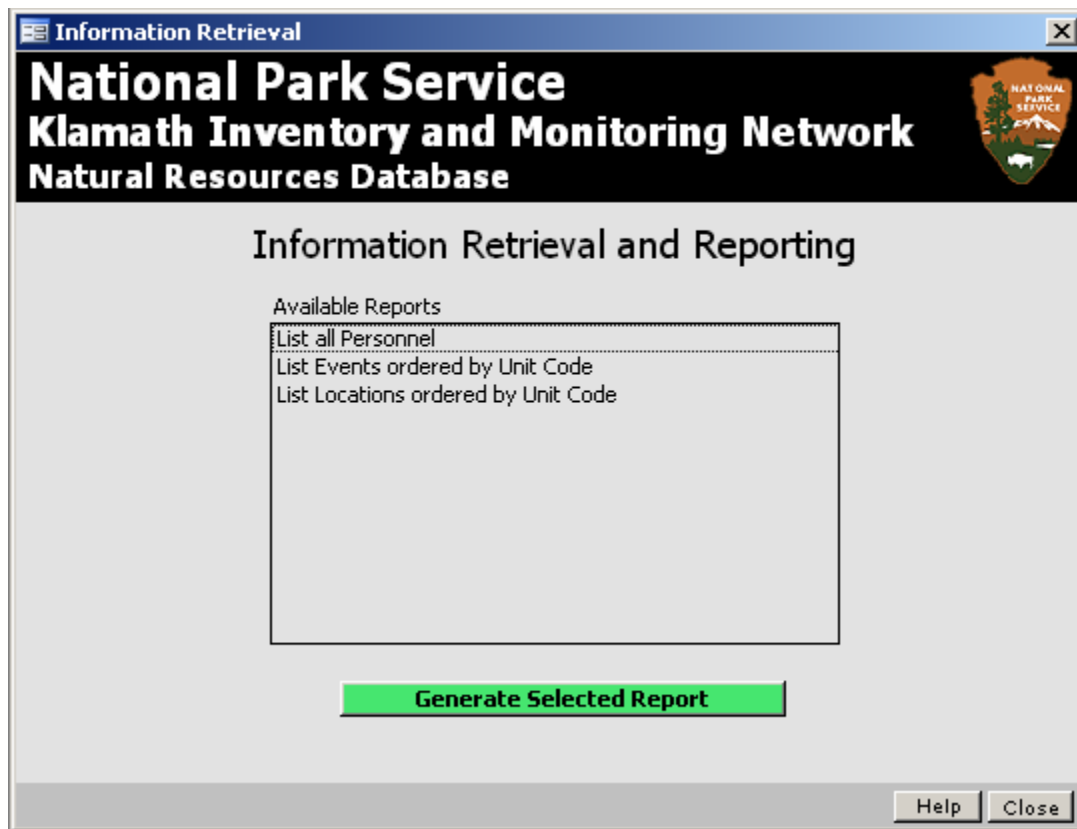
Figure 21 Information retrieval

4.2.6 Locations

Inventory and/or monitoring events occur at specific locations which are sometimes assigned to general collecting/monitoring areas within a natural resource district/park etc.. These must be identified and documented in detail with a high degree. The Natural Resource Database provides a mechanism for doing so. Figure 22 Locations and Figure 23 Sites are the user interface forms for doing so. The difference between the two displays is the specificity of the event location. Locations are defined as accurately as possible and sampling is specific to that location, while sites represent general areas which include specific locations. Sampling does not normally occur in a defined site without occurring at a specific location. Also, a sampling location does not need to have a specific area/site defined to be useful, whereas a site is not referenced in any database tables other than the `"tbl_Locations"` table.

Figure 22 Locations

Figure 23 Sites

4.2.7 Personnel

All personnel involved in the specification, collection or processing of inventory or monitoring information should be identified as well as their involvement or role in the process. This

function accomplishes most of that. A record is created for each involved individual thru the data entry display depicted in <u>Figure 24 Personnel</u>. The minimum amount of information that should be entered would be the individuals first and last name, their organization/agency and a means by which they may be contacted if needed. The collected data is stored in the "back-end" database table `"tbl_Contacts"` and is accessible in a number of user interface displays.

Figure 24 Personnel

4.3 Data backup

Data backup for the Natural Resource Database "back-end" may be accomplished using any one of a variety of backup devices and/or techniques. One simple technique is to make a copy of the database prior to adding or modifying any data within it. This is a highly recommended practice as data, once modified, can not be undone without a secondary copy of the database. More advanced backup mechanisms may exist such as a tape backup device. Consult with your Computer Specialist for their recommended backup device.

5 Known problems

There are several problems that may arise when using the Natural Resources Database. All of the problems identified below have occurred during development of this product:

- On at least one display - frm_Locations, using the tab key to move between fields when in the ADD mode, MS Access at times will save the record as displayed into the database.

- On rare occasions, the MS Access menu bar will disappear. This is a known problem within the entire MS Office suite that dates back to at least version 97 and has been reported to occur in ALL MS Office components - Word, Excel, Access, PowerPoint and Visio. The particular product, for reasons unknown will have corrupted a registry value that controls the main MS Access window and this cannot be corrected by un-installation and re-installation. The only known solution is to un-install the product, delete any remaining registry keys (there will be many - Microsoft does not clean up after itself!), and then re-install the product.

- MS Access will at times crash and corrupt the database file. This is a problem that goes back to Access 7.0/Access 95, although less so with MS Access 2003. This seems to occur during development activities which involve a great many modifications to forms and reports, all occurring in a single "session". The best solution is to keep a copy of the current released version of the "front-end" database file. If Access should crash and/or corrupt the database, make a new copy of this master and continue on. Another successful tactic is to create a new blank database and import ALL of the contents of the corrupt one. This has all ways worked for the developer. CAUTION: MS Access has a tendency to automatically change forms and queries, which leads to the next problem:

- MS Access will change queries and bound forms/fields upon perceived changes to the underlying query or database tables. If importing from a corrupt database into another, it is VERY important to import ALL database tables first INCLUDING ALL LINKED TABLES, followed by ALL queries, and lastly ALL Forms and then ALL reports, and code modules. This problem will show up as missing data on forms and reports or out-right error messages. Queries may have certain fields re-named and any table linkages present in the query will be deleted by Access.

6 Notes

7 References

Several documents are useful for the full understanding of the design, operation, and modification of both the "back-end" database as well as the "front-end" user interface.

Klamath Network Database Template Project Identification Types (version 5), 2003, National Park Service, Klamath Inventory and Monitoring Office, Ashland OR.

Klamath Network Data Dictionary for KPN Site Information Form, 2000, National Park Service, Klamath Inventory and Monitoring Office, Ashland OR.

Klamath Network Natural Resources Database - Database Design Description, 2005, National Park Service, Klamath Inventory and Monitoring Office, Ashland OR.

Klamath Network Natural Resources Database - Software Version Description, 2005, National Park Service, Klamath Inventory and Monitoring Office, Ashland OR.

Klamath Network's Site Information Form, 2000, National Park Service, Klamath Inventory and Monitoring Office, Ashland OR.

Natural Resource Database Template Version 3 Documentation, 2004, National Park Service, Washington Area Service Office, Inventory and Monitoring Program, Ft. Collins CO.